INERTIAL CONFINEMENT FUSION
Lawrence Livermore National Laboratory

Monthly Highlights

May 1998

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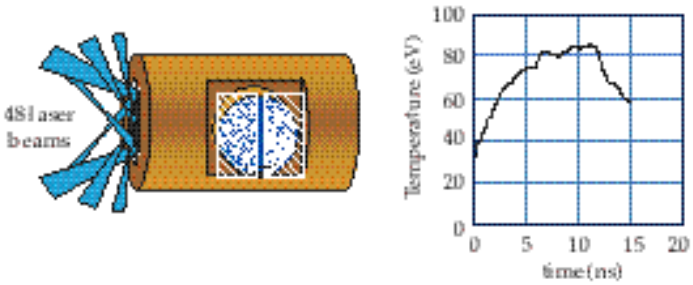
NIF Structural Steel Goes Up. As NIF construction continues, the steel framework erection has begun at the target area end of the building (see photo below); this work is being done by Nielson Dillingham, Inc. Meanwhile, all 18 of the target chamber plates have been formed and await final machining at Precision Components Corporation in Pennsylvania; the chamber will be installed in March 1999.

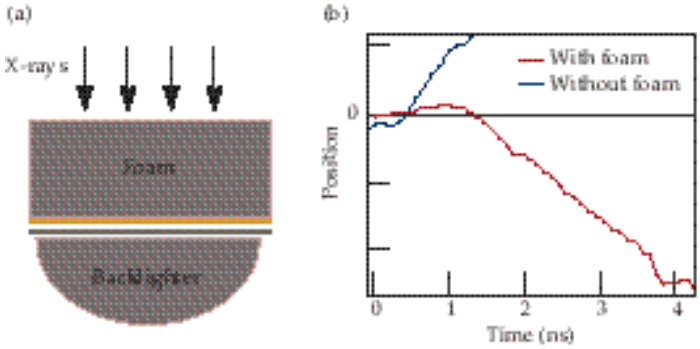
Steel erection begins around the NIF target area.

Omega Validation Studies Completed. A series of high-energy-density science validation experiments was recently completed on the Omega laser at the Laboratory for Laser Energetics in Rochester, New York. These experiments utilized the Omega laser in new and unique ways for stockpile stewardship activities. In one experiment, the laser was modified to provide 6 sets of laser beams sequentially delayed by 2 ns to provide a 12-ns pulse. These were used to create a hohlraum radiation temperature of ~80 eV to drive a supersonic radiation front in a low-density foam. Soft-x-ray opacity measurements required a time and spatially resolving spectrometer to be adapted and fielded on Omega for the first time.



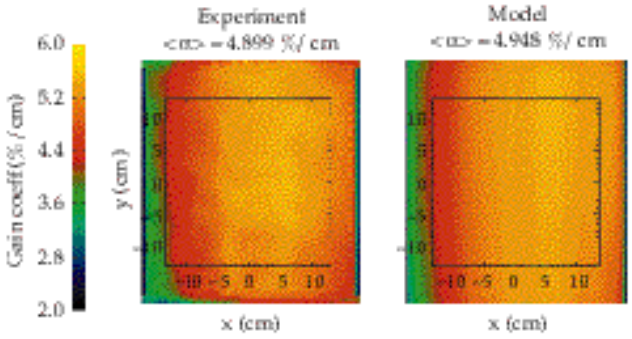
Low-density foam temperature in hohlraum.

Pressurized Foam Expands Experimental Capability . We have developed a new source for studying the hydrodynamics of compressible materials. These new experiments accelerate matter using material pressure generated by a "pressurized" foam. X rays from a hohlraum heat the foam shocklessly via a supersonic radiation wave [see (a) below]. The hot foam provides a pressure of ~20 Mbar, which can be used for a variety of experiments. For example a plastic package overcoated with gold has been driven both with and without the foam [see (b) below]; the gold expands in the case without the foam, and is driven downwards in the case with the foam, demonstrating the effect.



(a) Supersonic x-radiation wave heats the foam; (b) experimental results.

AMPLAB Gain Measurements. Gain measurements have recently been completed in the amplifier module prototype laboratory (AMPLAB) in full collaboration with the French CEA, who provided both hardware and scientific support. The prototype amplifier is similar to those planned for NIF. Gain distributions, shown below, are measured over the entire 40-cm-square apertures and agree with predictions based on a detailed 3D ray-trace code. The aperture-average gain coefficient for the beamline is 5.1%/cm, exceeding the NIF requirement of 5.0%/cm.



Results of AMPLAB gain measurements ("experiment") vs NIF beamline prediction ("model"); agreement is very close.

For comments about content of the *Monthly Highlights*, contact Bob Kauffman (925) 422-0419.
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